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# Alcohol Consumption and Morning Rise in Blood Pressure in Men From a Population-Based Study

Reto Auer<sup>1</sup> and Nicolas Rodondi<sup>1</sup>

In this issue of the Journal,<sup>1</sup> Nakashita *et al.* explore the influence of alcohol on 24-h blood pressure (BP). In a population-based study in the rural area in Japan, 194 men over 55 years had their BP measured every 30 min with a 24-h ambulatory BP monitoring (ABPM) device. Morning rise in BP was defined as the difference between the mean BP 2 h before, and 2 h after waking. For alcohol consumption, participants were classified as nondrinkers, those drinking less than two standard units of alcohol (22.8 g/day) as light drinkers, and those drinking more as heavy drinkers. After adjustment for risk factors for hypertension and hemorrhagic stroke, including dietary salt intake, the authors found that alcohol consumption was associated with a higher morning BP rise in heavy drinkers vs. nondrinkers ( $P = 0.044$ ) and across drinking categories ( $P < 0.001$ ). Strengths of this study include the 24-h ABPM, validated data on alcohol consumption, the population-based study design, as compared to several previous experimental studies in selective population, and the ability to account for several confounders, including salt intake. The morning rise in ABPM associated with alcohol consumption confirms findings of a previous study in 539 middle-aged men in Japan.<sup>2</sup>

In a previous prospective study, the same group followed 1,430 men and women over 10 years and measured 24-h ABPM.<sup>3</sup> They found an increased risk of hemorrhagic stroke in participants with a large morning rise in BP ( $\geq 25$  mmHg). Might we definitively conclude that the increase in hemorrhagic stroke by alcohol is driven by morning rise in BP? Certain limitations do not permit causal inference, in particular the cross-sectional design. Specific alcohol consumption was not recorded on the day of ABPM and only men were included, because of the small number of drinkers in women. Prospective studies should confirm this finding.

A finding that merits comments is the lack of statistically significant association between alcohol consumption and daytime BP, in opposite to several previous larger studies. This is likely related to the small number of participants (no statistical significance despite a 4 mmHg systolic BP difference across drinking groups) and to the relatively low consumption of

“heavy” drinkers, defined as drinking more than two standard units of alcohol in this population. Consistent with these hypotheses, we have recently found in a large population-based study of 5,769 adults in Switzerland that increasing alcohol consumption was associated in multivariate analyses with increased BP (from 127/79 to 132/82 mmHg,  $P$  values for trend  $< 0.001$ ) across drinking categories from nondrinkers (0 drink/week) to very high drinkers, defined as  $\geq 35$  drinks/week.<sup>4</sup> A daytime increase was also found in the previous study of 539 middle-aged men in Japan.<sup>2</sup>

What are the research implications of these findings? First, these results should be confirmed in women and in other ethnic groups. Previous prospective studies have found that light-to-moderate alcohol consumption decreased the risk of coronary heart disease and the risk of ischemic stroke, but increased the risk of hemorrhagic stroke and breast cancer, although with some conflicting results for both strokes.<sup>5</sup> Large population-based prospective studies examining these clinical end points should perform baseline 24-h ABPM, at least in a subgroup, use accurate measurements of alcohol consumption, and if possible, include truly heavy drinkers for whom prospective data are limited.<sup>4</sup>

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<sup>1</sup>Department of Ambulatory Care and Community Medicine, University of Lausanne, Lausanne, Switzerland. Correspondence: Nicolas Rodondi (nicolas.rodondi@hospv.d.ch)

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